

APPENDIX 8.1D

Construction Phase Impacts

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CONSTRUCTION PHASE IMPACTS

8.1D.1 Onsite Construction

Construction of the Project is expected to last approximately 22 months. The onsite construction will be performed in the following five main phases:

- Site preparation;
- Foundation work;
- Installation of major equipment;
- Construction/installation of major structures; and
- Start up and commissioning.

Site preparation includes clearing, grading, excavation of footings and foundations, and backfilling operations. After site preparation is finished, the construction of the foundations and structures is expected to begin. Once the foundations and structures are finished, installation and assembly of the mechanical and electrical equipment are scheduled to commence.

Fugitive dust emissions from the construction of the Project will result from:

- Dust entrained during site preparation and grading/excavation at the construction site;
- Dust entrained during onsite travel on paved and unpaved surfaces;
- Dust entrained during aggregate and soil loading and unloading operations; and
- Wind erosion of areas disturbed during construction activities.

Combustion emissions during construction will result from:

- Exhaust from the Diesel construction equipment used for site preparation, grading, excavation, and construction of onsite structures;
- Exhaust from water trucks used to control construction dust emissions;
- Exhaust from Diesel-powered welding machines, electric generators, air compressors, water pumps, etc.;
- Exhaust from Diesel trucks used to deliver concrete, fuel, and construction supplies to the construction site; and
- Exhaust from automobiles and trucks used by workers to commute to the construction site.

To determine the potential worst-case daily construction impacts, exhaust and dust emission rates have been evaluated for each source of emissions. Worst-case daily dust and exhaust emissions are expected to occur during month seven of the construction schedule. Annual emissions are based on the average equipment mix during the 22-month construction period.

8.1D.2 Natural Gas/Wastewater Pipelines and Transmission Lines

The installation of a 3.2-mile long natural gas pipeline will generate short-term construction impacts including fugitive dust and construction equipment combustion emissions. For this pipeline route, the excavation, installation of pipe, backfilling, and site cleanup will be performed in approximately 500-foot-long sections over a short duration to minimize fugitive dust and construction equipment combustion emissions.

The installation of the water pipeline will also generate short-term construction impacts including fugitive dust and construction equipment combustion emissions.

The proposed project also includes the installation of a 0.5-mile long transmission line interconnect. As with the construction of the natural gas and water pipelines, this construction activity will result in fugitive dust and construction equipment combustion emissions.

8.1D.3 Available Mitigation Measures

The following mitigation measures are proposed to control exhaust emissions from the Diesel heavy equipment used during construction of the Project:

- Operational measures, such as limiting engine idling time and shutting down equipment when not in use;
- Regular preventive maintenance to prevent emission increases due to engine problems;
- Use of low sulfur and low aromatic fuel meeting California standards for motor vehicle Diesel fuel; and
- Use of low-emitting Diesel engines meeting federal emissions standards for construction equipment if available.

The following mitigation measures are proposed to control fugitive dust emissions during construction of the project:

- Use either water application or chemical dust suppressant application to control dust emissions from unpaved surface travel and unpaved parking areas;
- Use vacuum sweeping and/or water flushing of paved road surface to remove buildup of loose material to control dust emissions from travel on the paved access road (including adjacent public streets impacted by construction activities) and paved parking areas;
- Cover all trucks hauling soil, sand, and other loose materials, or require all trucks to maintain at least two feet of freeboard;
- Limit traffic speeds on unpaved surfaces to 25 mph;
- Install sandbags or other erosion control measures to prevent silt runoff to roadways;
- Re-plant vegetation in disturbed areas as quickly as possible;
- As needed, use gravel pads along with wheel washers or wash tires of all trucks exiting construction site that carry track-out dirt from unpaved surfaces; and
- Mitigate fugitive dust emissions from wind erosion of areas disturbed from construction activities (including storage piles) by application of either water or chemical dust suppressant and/or use of wind breaks.

8.1D.4 Estimation of Emissions with Mitigation Measures

8.1D.4.1 Onsite Construction

Tables 8.1D-1 and 8.1D-2 show the estimated maximum daily and annual heavy equipment exhaust and fugitive dust emissions with recommended mitigation measures for onsite construction activities. Detailed emission calculations are included as Attachment 8.1D-1.

8.1D.4.2 Pipeline/Transmission Line Construction

Table 8.1D-3 shows the estimated maximum daily heavy equipment exhaust and fugitive dust emissions with recommended mitigation measures for the natural gas pipeline, water pipeline, and transmission line interconnect construction activities. The following is the expected construction period for each pipeline/transmission line route:

- Natural gas pipeline – 12 months
- Water pipeline – 12 months
- Transmission line interconnect – 1 month

Because of the temporary nature of these construction activities, annual emissions are not shown in the following emission summary tables for these construction activities. Detailed emission calculations are included as Attachment 8.1D-1.

Table 8.1D-1
Maximum Daily Emissions During Onsite Construction
(Month 7; Maximum Dust Emissions), Pounds Per Day

	NO _x	CO	POC	SO _x	PM ₁₀
Onsite					
Construction Equipment	136.13	64.92	10.69	0.12	6.36
Fugitive Dust	--	--	--	--	28.58
Offsite					
Worker Travel, Truck/Rail Deliveries	51.32	391.38	32.03	0.83	1.79
Total Emissions					
Total	187.45	456.30	42.72	0.95	36.72

Table 8.1D-2
Annual Emissions During Onsite Construction, Tons Per Year

	NO _x	CO	VOC	SO _x	PM ₁₀
Onsite					
Construction Equipment	10.42	7.26	1.10	0.01	0.67
Fugitive Dust	--	--	--	--	0.96
Offsite					
Worker Travel, Truck/Rail Deliveries	6.51	48.98	4.01	0.11	0.23
Total Emissions					
Total	16.93	56.25	5.11	0.12	1.86

Table 8.1D-3
Maximum Daily Emissions During Pipeline/Transmission Line Interconnect Construction
Pounds Per Day

	NO _x	CO	VOC	SO _x	PM ₁₀
Natural Gas Pipeline					
Onsite					
Construction Equipment	55.81	17.93	4.14	1.89	2.77
Fugitive Dust	--	--	--	--	4.66
Offsite					
Truck Deliveries and Worker Travel	18.56	11.61	1.67	0.77	1.04
Total Emissions	74.37	29.54	5.81	2.66	8.47
Water Pipeline					
Onsite					
Construction Equipment	61.98	22.61	4.85	2.22	3.17
Fugitive Dust	--	--	--	--	5.47
Offsite					
Truck Deliveries and Worker Travel	27.84	17.42	2.50	1.15	1.56
Total Emissions	89.82	40.03	7.35	3.37	8.64
Transmission Line Interconnect					
Onsite					
Construction Equipment	76.13	15.58	4.83	2.20	3.47
Fugitive Dust	--	--	--	--	1.14
Offsite					
Truck Deliveries and Worker Travel	46.40	29.03	4.17	1.92	2.61
Total Emissions	122.53	44.61	9.00	4.12	7.22

8.1D.5 Analysis of Ambient Impacts from Onsite Construction

Ambient air quality impacts from emissions during construction of the Project were estimated using an air quality dispersion modeling analysis. The modeling analysis considers the construction site location, the surrounding topography, and the sources of emissions during construction, including vehicle and equipment exhaust emissions and fugitive dust.

8.1D.5.1 Dispersion Model

As in the analysis of project operating impacts, the EPA-approved Industrial Source Complex Short Term (ISCST3) model was used to estimate ambient impacts from construction activities. A detailed discussion of the ISCST3 dispersion model is included in Section 8.1.5.

The emission sources for the construction site were grouped into two categories: exhaust emissions and dust emissions. An effective emission plume height of 4.15 meters was used for all exhaust emissions.¹ For construction dust emissions, an effective plume height of 0.5 meters was used in the modeling analysis. The exhaust and dust emissions were modeled as area sources that covered the total area of the construction site. The construction impacts modeling analysis used the same receptor locations as used for the project operating

¹ This release height is based on the data used in ARB's Diesel Risk Reduction Plan for Diesel vehicles.

impact analysis. A detailed discussion of the receptor locations is included in Section 8.1.5 of the AFC.

To determine the construction impacts on short-term ambient standards (24 hours and less), the worst-case daily onsite construction emission levels shown in Table 8.1D-1 were used. For pollutants with annual average ambient standards, the annual onsite emission levels shown in Table 8.1D-2 were used. The same meteorological data set and background ambient levels used for the project operating modeling analysis was used for the construction emission impacts analysis.

8.1D.5.2 Modeling Results

Based on the emission rates of NO_x, SO₂, CO, and PM₁₀ and the meteorological data, the ISCST3 model calculates hourly and annual ambient impacts for each pollutant. As mentioned above, the modeled 1-hour, 3-hour, 8-hour, and 24-hour ambient impacts are based on the worst-case daily emission rates of NO_x, SO₂, CO, and PM₁₀. The annual impacts are based on the annual emission rates of these pollutants.

The one-hour and annual average concentrations of NO₂ were computed following the revised EPA guidance for computing these concentrations (August 9, 1995 *Federal Register*, 60 FR 40465). The OLM_ISC model was used for the one-hour average NO₂ impacts. The annual average was calculated using the ambient ratio method (ARM) with the EPA default value of 0.75 for the annual average NO₂/NO_x ratio.

The modeling analysis results are shown in Table 8.1D-4. Also included in the table are the maximum background levels that have occurred during the past few years and the resulting total ambient impacts. As shown in Table 8.1D-4, construction impacts alone for all modeled pollutants are expected to be below the most stringent state and national standards. With the exception of 24-hour and annual PM₁₀ impacts, construction activities are not expected to cause the violation of any state or federal ambient air quality standard. However, the state 24-hour and annual average PM₁₀ standards are exceeded in the absence of the construction emissions for the Project.

Table 8.1D-4
Modeled Maximum Construction Impacts

Pollutant	Averaging Time	Maximum Construction Impacts ($\mu\text{g}/\text{m}^3$)	Background ($\mu\text{g}/\text{m}^3$)	Total Impact ($\mu\text{g}/\text{m}^3$)	State Standard ($\mu\text{g}/\text{m}^3$)	Federal Standard ($\mu\text{g}/\text{m}^3$)
NO ₂ ^a	1-Hour	254	181	435	470	--
	Annual	37.8	35.8	73.6	--	100
SO ₂	1-Hour	0.6	76.0	76.6	650	--
	3-Hour	0.4	52.4	52.8	--	1300
	24-Hour	0.1	23.6	23.7	109	365
	Annual	0.03	5.2	5.2	--	80
CO	1-Hour	353	5,730	6,083	23,000	40,000
	8-Hour	153	4,206	4,359	10,000	10,000
PM ₁₀	24-Hour	109	157	266	50	150
	Annual ^b	11.0	33	44	30	--
	Annual ^c	11.0	45.9	56.9	20 ^d	50
Notes:						
a. OLM_ISC used for 1-hr average impact and ARM applied for annual average, using EPA default ratio of 0.75.						
b. Annual Geometric Mean.						
c. Annual Arithmetic Mean.						
d. New state PM ₁₀ standard approved but not yet effective.						

The dust mitigation measures already proposed by the applicant are expected to be very effective in minimizing fugitive dust emissions. The attached isopleth diagrams show the extent of the modeled impacts

from construction PM₁₀ for the 24-hour and annual averaging periods. As shown on these isopleths, while maximum impacts occur next to the project site fenceline, concentrations decrease rapidly at locations only a couple of hundred meters away from the project site. For example, as shown on the isopleths for 24-hr average PM₁₀ impacts, along the fenceline PM₁₀ impacts are approximately 100 µg/m³. However, at locations only 200 meters way from the fenceline PM₁₀ impacts decrease to approximately 20 µg/m³ (only 20% of the level at the fenceline).

It is also important to note that emissions in an exhaust plume are dispersed through the entrainment of ambient air, which dilutes the concentration of the emissions as they are carried away from the source by winds. The process of mixing the pollutants with greater and greater volumes of cleaner air is controlled primarily by the turbulence in the atmosphere. This dispersion occurs both horizontally, as the exhaust plume rises above the emission point, and vertically, as winds carry the plume horizontally away from its source.

The rise of a plume above its initial point of release is a significant contributing factor to the reductions in ground-level concentrations, both because a rising plume entrains more ambient air as it travels downwind, and because it travels farther downwind (and thus also undergoes more horizontal dispersion) before it impacts the ground. Vertical plume rise occurs as a result of buoyancy (plume is hotter than ambient air, and hot air, being less dense, tends to rise) and/or momentum (plume has an initial vertical velocity).

In ISCST3, area sources are not considered to have either buoyant or momentum plume rise, and therefore the model assumes that there is no vertical dispersion taking place. Thus a significant source of plume dilution is ignored when sources are modeled as area sources in ISCST3.

The project construction site impacts are not unusual in comparison to most construction sites; construction sites that use good dust suppression techniques and low-emitting vehicles typically do not cause violations of air quality standards. The input and output modeling files are being provided electronically.

8.1D.5.3 Health Risk from Diesel Exhaust

The combustion portion of annual PM₁₀ emissions from Table 8.1D-2 above were modeled separately to determine the annual average Diesel PM₁₀ exhaust concentration. This was used with the ARB-approved unit risk value of 300 in one million for a 70-year lifetime to determine the potential carcinogenic risk from Diesel exhaust during construction. The exposure was also adjusted by a factor of 2/70, or 0.0286, to correct for the 24-month exposure during the construction period.

The maximum modeled annual average concentration of Diesel exhaust PM₁₀ is 2.41 ug/m³. Using the unit risk value and adjustment factors described above, the carcinogenic risk due to exposure to Diesel exhaust during construction activities is expected to be approximately 21 in one million. This is above the 10 in one million level considered to be significant under the San Joaquin Valley APCD's CEQA guidelines.

However, these impacts are highly localized near the project site and are much lower at the nearest residences, which are approximately 200 meters away. As shown in the attached annual average Diesel combustion PM₁₀ isopleth diagram, the area in which the risk may exceed 10 in one million (i.e., ambient annual average Diesel PM₁₀ impact equal to or greater than 1.2 ug/m³) extends less than 100 meters from the facility fenceline. The area in which the risk may exceed 1 in one million (Diesel PM₁₀ impact equal to or greater than 0.12 ug/m³) extends about 700 meters from the southwest facility fenceline. This analysis remains conservative because, as discussed above, the modeled PM₁₀ concentrations from construction operations are overpredicted by the ISCST3 model.

8.1D.5.4 Analysis of Ambient Impacts from Pipeline/Transmission Line Interconnect Construction

Construction of the natural gas/wastewater pipelines and the transmission line interconnect activities will be of short duration, will require minimal equipment, and will generally occur along public roads and utility rights-of-way covering a large geographical area. Therefore, the potential ambient air quality impacts associated with these construction projects are expected to be minimal.

Figure 8.1D-1
Walnut Energy Center
24-hour PM₁₀ Impacts from Construction, $\mu\text{g}/\text{m}^3$

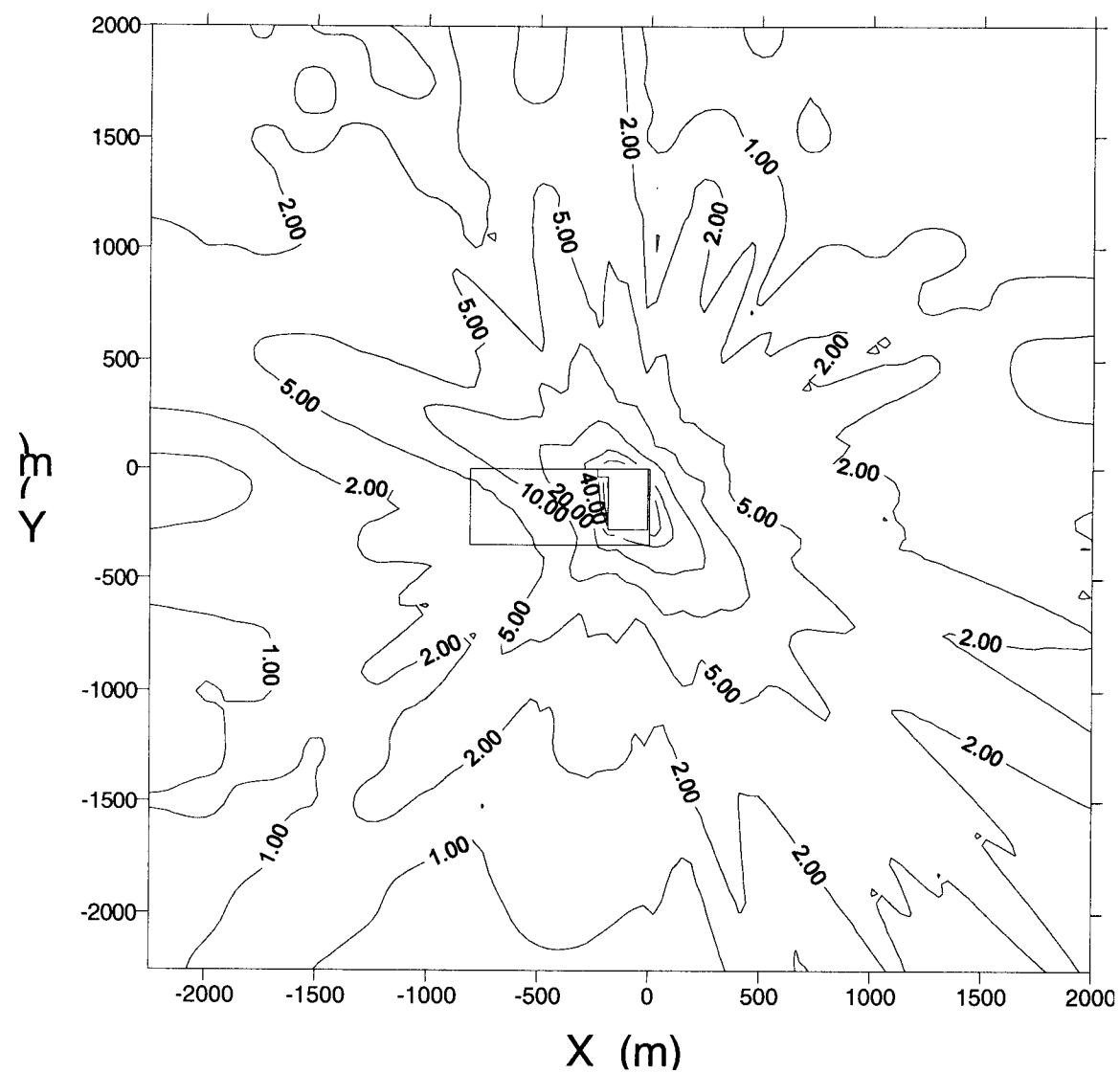


Figure 8.1D-2
Walnut Energy Center
Annual PM₁₀ Impacts from Construction, $\mu\text{g}/\text{m}^3$

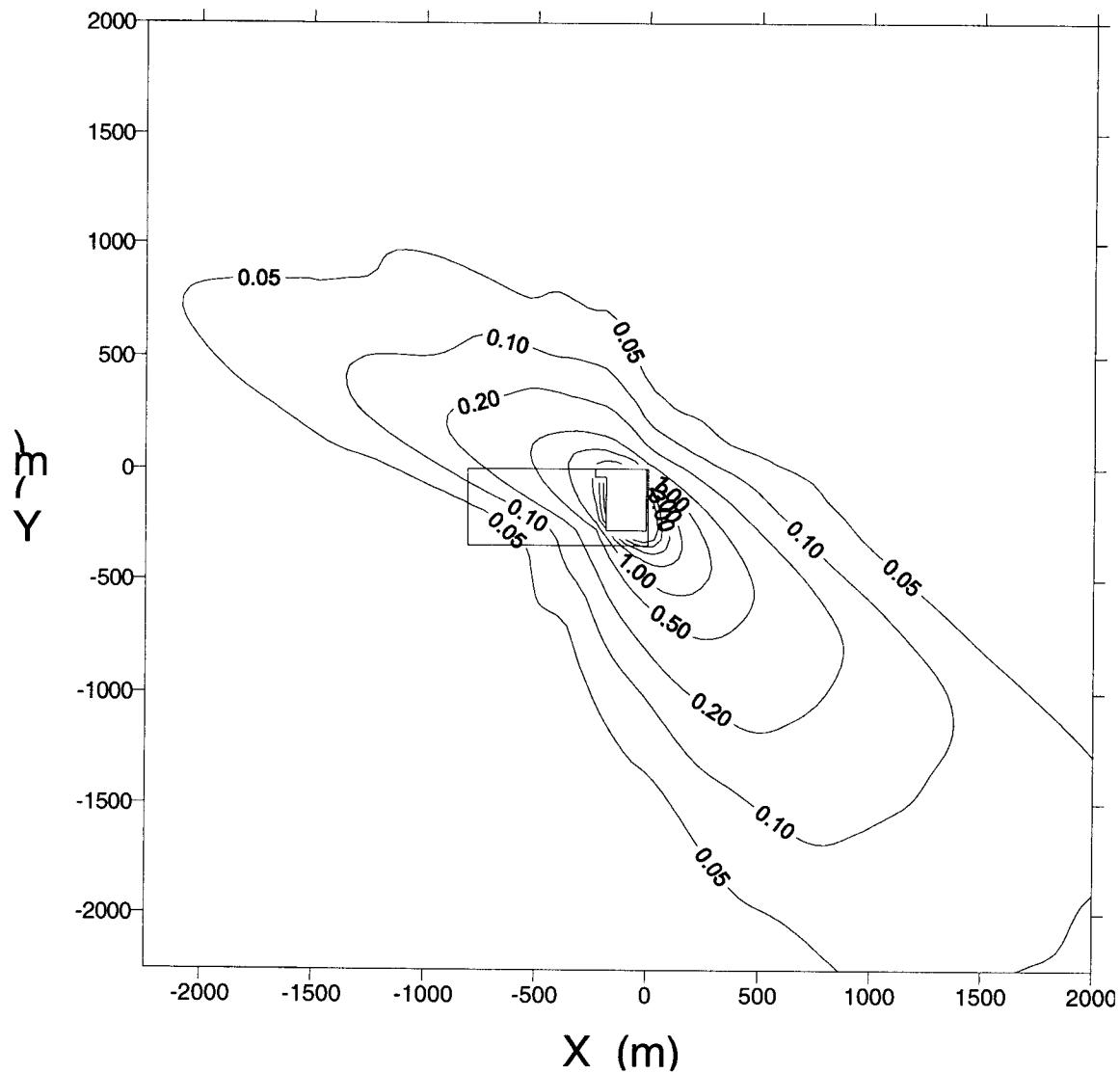
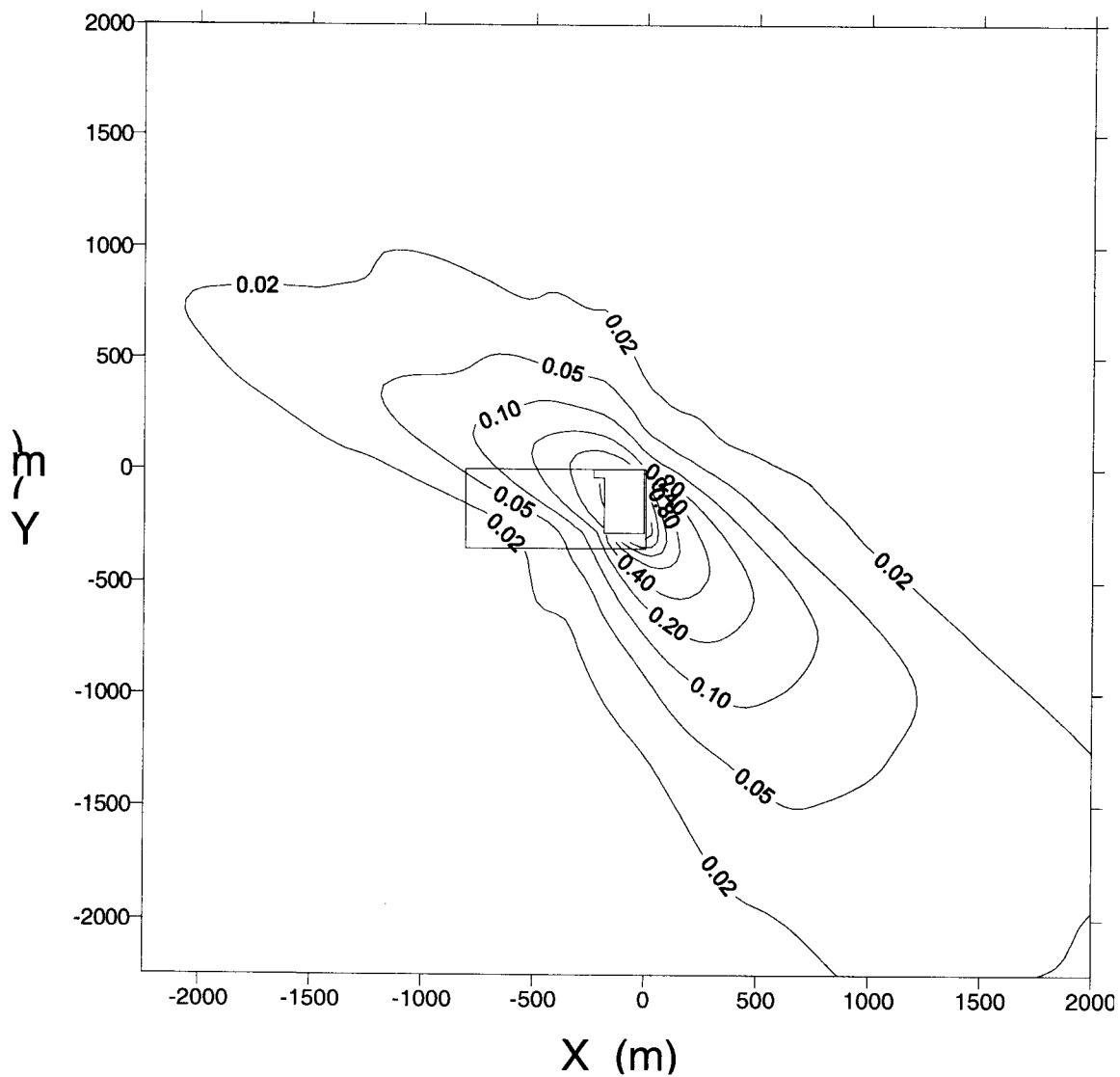


Figure 8.1D-3
Walnut Energy Center
Annual Diesel PM₁₀ Impacts from Construction, $\mu\text{g}/\text{m}^3$



ATTACHMENT 8.1D-1

DETAILED CONSTRUCTION EMISSION CALCULATIONS

Walnut Energy Center Project

Construction Equipment Daily Exhaust Emissions (Month 7)

Equipment	Fuel	Number of Units	Hrs/Day	Gals/Hr Per Unit	Total Fuel Use (Gals/day)	Emission Factors (lbs/1000 gals)(1)			Daily Emissions (lbs/day)		
						NOx	CO	POC	NOx	CO	SOx
Crawler Crane- Greater than 300 ton	D	0	2	7.50	0.00	270.01	39.13	15.65	0.21	11.74	0.00
Crawler Crane- Greater than 200 ton	D	0	4	5.00	0.00	270.01	39.13	15.65	0.21	11.74	0.00
Crane - Mobile 65 ton	D	0	4	4.00	0.00	270.01	39.13	15.65	0.21	11.74	0.00
Cranes -Mobile 45 ton	D	0	4	4.00	0.00	270.01	39.13	15.65	0.21	11.74	0.00
Cranes - Mobile 35 ton	D	0	4	4.00	0.00	270.01	39.13	15.65	0.21	11.74	0.00
Bulldozer D6H	D	1	8	5.50	44.00	270.01	39.13	15.65	0.21	11.74	11.88
Bulldozer D4C	D	1	8	3.00	24.00	270.01	39.13	15.65	0.21	11.74	1.72
Excavator- Trencher	D	0	8	2.00	0.00	270.01	39.13	15.65	0.21	11.74	6.48
Excavator- Earth Scraper	D	3	8	9.00	216.00	270.01	39.13	15.65	0.21	11.74	58.32
Excavator- Motor Grader	D	1	8	5.00	40.00	270.01	39.13	15.65	0.21	11.74	10.80
Excavator- Backhoe/loader	D	0	8	2.50	0.00	270.01	39.13	15.65	0.21	11.74	0.00
Excavator - loader	D	1	8	2.50	20.00	270.01	39.13	15.65	0.21	11.74	5.40
Vibratory Roller	D	1	8	10.00	80.00	270.01	39.13	15.65	0.21	11.74	0.00
Portable Compaction roller	D	0	8	10.00	0.00	270.01	39.13	15.65	0.21	11.74	0.00
Truck- Water	D	1	8	3.13	25.04	170.68	106.79	15.33	0.21	9.59	4.27
Forklift	D	1	4	2.50	10.00	270.01	39.13	15.65	0.21	11.74	2.67
Dump Truck	D	2	8	3.13	50.08	170.68	106.79	15.33	0.21	9.59	2.70
Service Truck- 1 ton	D	0	8	1.56	0.00	74.40	59.47	5.57	0.21	4.83	0.00
Truck- Fuel/Lube	D	1	2	3.13	6.26	170.68	106.79	15.33	0.21	9.59	1.07
Concrete Pump Truck	D	0	8	3.13	0.00	170.68	106.79	15.33	0.21	9.59	0.00
Tractor Truck 5th Wheel	D	0	8	3.13	0.00	170.68	106.79	15.33	0.21	9.59	0.00
Trucks- Pickup 3/4 ton	G	2	8	0.78	12.48	62.81	677.30	46.28	0.27	1.56	8.45
Trucks- 3 ton	D	1	8	1.56	12.48	74.40	59.47	5.57	0.21	4.83	0.00
Diesel Powered Welder	D	0	4	1.27	0.00	313.05	195.66	46.96	0.21	39.13	0.00
Light Plants	D	0	8	1.27	0.00	313.05	195.66	46.96	0.21	39.13	0.00
Portable Compaction- Vibratory Plate	D	0	8	0.25	0.00	313.05	195.66	46.96	0.21	39.13	0.00
Portable Compaction- Vibratory Ram	D	0	8	0.25	0.00	313.05	195.66	46.96	0.21	39.13	0.00
Articulating Boom Platforms	D	0	8	0.25	0.00	313.05	195.66	46.96	0.21	39.13	0.00
Pumps	G	2	8	0.13	2.03	79.44	13813.38	748.58	0.00	2.35	0.16
Air Compressor 185 CFM	D	1	8	1.27	10.16	313.05	195.66	46.96	0.21	39.13	28.07
Air Compressor 750 CFM	D	0	8	1.27	0.00	313.05	195.66	46.96	0.21	39.13	1.99
Concrete Vibrators	D	0	8	0.25	0.00	313.05	195.66	46.96	0.21	39.13	0.00
Concrete Trowel Machine	D	0	8	1.27	0.00	313.05	195.66	46.96	0.21	39.13	0.00
Fusion Welder	D	0	8	1.27	0.00	313.05	195.66	46.96	0.21	39.13	0.00
Portable Power Generators	D	0	8	1.27	0.00	313.05	195.66	46.96	0.21	39.13	0.00
Total										136.13	64.92
Total for Gasoline-Powered Equip										0.95	36.52
Total for Diesel-Powered Equip										135.18	28.40
Notes:											
(1) See notes for combustion emissions.											

Notes:

(1) See notes for combustion emissions.

Total 136.13 64.92 0.95 36.52 135.18 28.40 0.11 6.33

Construction Equipment Annual Exhaust Emissions
Walnut Energy Center Project

Equipment	Gasoline/ Diesel	Average Number of Units Per Year(1)	Average Operating Hrs/Day Per Unit	Gals/Hr Per Unit	Average Operating Days per Year	Total Fuel Use (Gals/yr)	Emission Factors (lbs/1000 gals)(2)			Annual Emissions (tons/yr)		
							NOx	CO	POC	PM10	NOx	CO
Crawler Crane- Greater than 300 ton	D	0.41	2	7.50	250	1,534	270.01	39.13	15.65	0.21	11.74	0.21
Crawler Crane- Greater than 200 ton	D	1.05	4	5.00	250	5,227	270.01	39.13	15.65	0.21	11.74	0.71
Crane - Mobile 65 ton	D	0.91	4	4.00	250	3,636	270.01	39.13	15.65	0.21	11.74	0.49
Cranes -Mobile 45 ton	D	0.50	4	4.00	250	2,000	270.01	39.13	15.65	0.21	11.74	0.27
Cranes - Mobile 35 ton	D	0.95	4	4.00	250	3,818	270.01	39.13	15.65	0.21	11.74	0.52
Dozer D6H	D	0.14	8	5.50	250	1,500	270.01	39.13	15.65	0.21	11.74	0.20
Dozer D4C	D	0.18	8	3.00	250	1,091	270.01	39.13	15.65	0.21	11.74	0.15
Excavator- Trencher	D	0.27	8	2.00	250	1,091	270.01	39.13	15.65	0.21	11.74	0.15
Excavator- Earth Scraper	D	0.14	8	9.00	250	2,455	270.01	39.13	15.65	0.21	11.74	0.33
Excavator-Motor Grader	D	0.32	8	5.00	250	3,182	270.01	39.13	15.65	0.21	11.74	0.43
Excavator- Backhoe/loader	D	0.73	8	2.50	250	3,636	270.01	39.13	15.65	0.21	11.74	0.49
Excavator - loader	D	0.18	8	2.50	250	909	270.01	39.13	15.65	0.21	11.74	0.12
Vibration Roller	D	0.36	8	10.00	250	7,273	270.01	39.13	15.65	0.21	11.74	0.98
Portable Compaction roller	D	0.36	8	10.00	250	7,273	270.01	39.13	15.65	0.21	11.74	0.14
Truck- Water	D	0.73	8	3.13	250	4,553	170.68	106.79	15.33	0.21	9.59	0.39
Forklift	D	1.00	4	2.50	250	2,500	270.01	39.13	15.65	0.21	11.74	0.34
Dump Truck	D	0.27	8	3.13	250	1,707	170.68	106.79	15.33	0.21	9.59	0.15
Service Truck- 1 ton	D	0.41	8	1.56	250	1,276	74.40	59.47	5.57	0.21	4.83	0.05
Truck- Fuel/Lube	D	0.77	2	3.13	250	1,209	170.68	106.79	15.33	0.21	9.59	0.10
Concrete Pump Truck	D	0.14	8	3.13	250	854	170.68	106.79	15.33	0.21	9.59	0.07
Tractor Truck 5th Wheel	D	0.82	8	3.13	250	5,122	170.68	106.79	15.33	0.21	9.59	0.44
Trucks- Pickup 3/4 ton	G	3.73	8	0.78	250	5,815	62.81	677.30	46.28	0.27	1.56	0.18
Trucks- 3 ton	D	1.82	8	1.56	250	5,673	74.40	59.47	5.57	0.21	4.83	0.05
Diesel Powered Welder	D	0.91	4	1.27	250	1,155	313.05	195.66	46.96	0.21	39.13	0.18
Light Plants	D	1.55	8	1.27	250	3,925	313.05	195.66	46.96	0.21	39.13	0.61
Portable Compaction- Vibratory Plate	D	1.18	8	0.25	250	591	313.05	195.66	46.96	0.21	39.13	0.09
Portable Compaction- Vibratory Ram	D	1.00	8	0.25	250	509	313.05	195.66	46.96	0.21	39.13	0.08
Articulating Boom Platforms	D	2.59	8	0.25	250	1,295	313.05	195.66	46.96	0.21	39.13	0.13
Pumps	G	1.09	8	0.13	250	277	79.44	13813.38	748.58	0.00	2.35	0.01
Air Compressor 185 CFM	D	0.95	8	1.27	250	2,425	313.05	195.66	46.96	0.21	39.13	0.38
Air Compressor 750 CFM	D	1.38	8	1.27	250	3,508	313.05	195.66	46.96	0.21	39.13	0.55
Concrete Vibrators	D	2.14	8	0.25	250	1,068	313.05	195.66	46.96	0.21	39.13	0.34
Concrete Trowel Machine	D	0.59	8	1.27	250	150	313.05	195.66	46.96	0.21	39.13	0.17
Fusion Welder	D	0.29	8	1.27	250	726	313.05	195.66	46.96	0.21	39.13	0.02
Portable Power Generators	D	0.14	8	1.27	250	346	313.05	195.66	46.96	0.21	39.13	0.07
Total											10.42	7.26
Total for Gasoline-Powered Equip											0.19	3.88
Total for Diesel-Powered Equip											10.22	3.38

Notes:

(1) Based on average number of units operating over 22-month construction period.

(2) See notes on combustion emissions.

Delivery Truck Daily Emissions (Month 7)
Walnut Energy Center Project

Number of Deliveries Per Day(1)	Average Round Trip Haul Distance (miles)	Vehicle Miles Traveled Per Day	Emission Factors (lbs/vmt)(1)			Daily Emissions (lbs/day)						
			NOx	CO	POC	SOx	PM10	NOx	CO	POC	SOx	PM10
10	70	700	0.0280	0.0175	0.0025	0.0012	0.00016	19.61	12.27	1.76	0.81	1.10
Idle exhaust (2)												0.042

Notes:

- (1) See notes for combustion emissions.
- (2) 10 trucks per day times 1 hr idle time per visit times 0.0042 lb/hr.

Delivery Truck Daily Emissions (Month 16) Walnut Energy Center Project												
Number of Deliveries Per Day(1)	Average Round Trip Haul Distance (miles)	Vehicle Miles Traveled Per Day	Emission Factors (lbs/vmt)(1)			Daily Emissions (lbs/day)						
			NOx	CO	POC	SOx	PM10	NOx	CO	POC	SOx	PM10
20	70	1400	0.0280	0.0175	0.0025	0.0012	0.00016	39.23	24.54	3.52	1.62	2.20
Idle exhaust (2)												0.084

Notes:

- (1) See notes for combustion emissions.
- (2) 20 trucks per day times 1 hr idle time per visit times 0.0042 lb/hr.

Delivery Truck Annual Emissions Walnut Energy Center Project												
Average Number of Deliveries Per Year	Average Round Trip Haul Distance (miles)	Vehicle Miles Traveled Per Year	Emission Factors (lbs/vmt)(1)			Annual Emissions (tons/yr)						
			NOx	CO	POC	SOx	PM10	NOx	CO	POC	SOx	PM10
2600	70	182000.00	0.0280	0.0175	0.0025	0.0012	0.00016	2.55	1.60	0.23	0.11	0.14
Idle exhaust (2,3)												0.00546

Notes:

- (1) See notes for combustion emissions.
- (2) Annual average of 10 trucks per day, 240 days per year times 1 hr idle time per visit times 0.0042 lb/hr
- (3) Based on 1.91 g/hr idle emission rate for the composite HDD truck fleet in 2001 from EPA's PART5 model.

Worker Travel Daily Emissions (Month 7)
Walnut Energy Center Project

Number of Workers Per Day(1)	Average Vehicle Occupancy (person/veh.)	Number of Round Trips Per Day	Average Round Trip Haul Distance (Miles)	Vehicle Miles Traveled Per Day (Miles)	Emission Factors (lbs/vmt)(1)			Daily Emissions (lbs/day)		
					CO	POC	SOx	PM10	NOx	CO
205	1.3	158	70	11038	0.0029	0.0343	0.0027	0.0000	0.0001	31.71
										30.27
										0.02
										0.64

Notes:
 (1) See notes for combustion emissions.

Worker Travel Daily Emissions (Month 16)
Walnut Energy Center Project

Number of Workers Per Day(1)	Average Vehicle Occupancy (person/veh.)	Number of Round Trips Per Day	Average Round Trip Haul Distance (Miles)	Vehicle Miles Traveled Per Day (Miles)	Emission Factors (lbs/vmt)(1)			Daily Emissions (lbs/day)		
					CO	POC	SOx	PM10	NOx	CO
386	1.3	297	70	20785	0.0029	0.0343	0.0027	0.0000	0.0001	59.71
										713.83
										57.00
										0.04
										1.21

Notes:
 (1) See notes for combustion emissions.

Worker Travel Annual Emissions
Walnut Energy Center Project

Average Number of Workers Per Day	Average Vehicle Occupancy (person/veh.)	Number of Round Trips Per Day	Average Round Trip Haul Distance (Miles)	Days per Year	Vehicle Miles Traveled Per Year	Emission Factors (lbs/vmt)(1)			Annual Emissions (tons/yr)		
						CO	POC	SOx	PM10	NOx	CO
205	1.3	158	70	250	2,759,615	0.0029	0.0343	0.0027	0.0000	0.0001	3.96
											47.39
											3.78
											0.00
											0.08

Notes:
 (1) See notes for combustion emissions.

Daily Fugitive Dust Emissions (Month 7) Walnut Energy Center Project						
Equipment	Number of Units	Daily Process Rate Per Unit	Total Process Rate	Units	PM10 Emission Factor(1) (lbs/unit)	PM10 Control Factor(1) (%)
Bulldozer D6H	1	8.0	8.0 hours	0.7528	88%	0.75
Bulldozer D4C	1	8.0	8.0 hours	0.7528	88%	0.75
Excavator- Trencher Excavation	0					
Excavator- Earth Scraper Excavation	3	8.0	24.0 hours	0.7528		18.07
Excavator- Earth Scraper Unpaved Road Travel	3	14.5	43.6vmt	0.2656	88%	1.44
Excavator-Motor Grader	1	24.0	24.0vmt	0.2754	88%	0.82
Excavator- Backhoe Excavation	0					
Excavator - Loader Excavation	1	3,250.0	3,250.0tons	0.0004	88%	0.17
Excavator - Loader Unpaved Road Travel	1	28.4	28.4vmt	0.1148	88%	0.41
Water Truck Unpaved Road Travel	1	20.0	20.0vmt	0.1522	88%	0.38
Forklift Unpaved Road Travel	1	16.0	16.0vmt	0.0970	88%	0.19
Dump Truck Unpaved Road Travel	2	13.6	27.3vmt	0.1589	88%	0.54
Dump Truck Unloading	2	1,625.0	3,250.0tons	0.0004		1.38
Service Truck Unpaved Road Travel	0					
Fuel/Lube Truck Unpaved Road Travel	1	3.4	3.4vmt	0.1181	88%	0.05
Concrete Pumper Truck Unpaved Road Travel	0					
Tractor Truck 5th Wheel Unpaved Road Travel	0					
Pickup Truck Unpaved Road Travel	2	17.0	34.1vmt	0.0599	88%	0.25
3 ton Truck Unpaved Road Travel	1	8.5	8.5vmt	0.0803	88%	0.09
Windblown Dust (active construction area)	N/A	816,927.0	816,927.0sq.ft.	2.523E-05	88%	2.57
Worker Gravel Road Travel	205	0.5	100.9vmt	0.0477	88%	0.60
Delivery Truck Gravel Road Travel	10	0.5	4.9vmt	0.1266	88%	0.08
Delivery Truck Unpaved Road Travel	10	0.2	1.7vmt	0.1589	88%	0.03
Total =						28.58

Notes:
 (1) See notes for fugitive dust emission calculations.

**Annual Fugitive Dust Emissions
Walnut Energy Center Project**

Activity	Average Daily PM10 Emissions(1) (lbs/day)	Days per Year	Annual PM10 Emissions (tons/yr)
Construction Activities		6.73	250
Windblown Dust	0.66	365	0.12
Total =			0.96

Notes:

- (1) Based on average of daily emissions during 22-month construction period.

Natural Gas Pipeline Construction Heavy Equipment Daily Emissions

Equipment	Equipment Rating	Equipment Units	Load Factor(1)	Number of Units	Hrs/Day Per Unit	NOx	CO	Emission Factors (1) VOC	SOx	PM10	Units	NOx	CO	Daily Emissions (lbs/day) VOC	SOx	PM10		
Trencher	150bhp	0.38	1	10	6.90	1.00	0.40	0.18	0.30 gm/bhp-hr	8.67	1.26	0.50	0.23	0.38				
Backhoe	100bhp	0.38	1	10	6.90	1.00	0.40	0.18	0.30 gm/bhp-hr	5.78	0.84	0.34	0.15	0.25				
Compactor	100bhp	0.59	1	10	6.90	1.00	0.40	0.18	0.30 gm/bhp-hr	8.97	1.30	0.52	0.24	0.39				
Paving machine	100bhp	0.56	1	10	6.90	1.00	0.40	0.18	0.30 gm/bhp-hr	8.52	1.23	0.49	0.22	0.37				
Grader	100bhp	0.54	1	10	6.90	1.00	0.40	0.18	0.30 gm/bhp-hr	8.21	1.19	0.48	0.22	0.36				
Water Truck	150bhp	0.65	1	10	3.36	2.60	0.39	0.18	0.22 gm/bhp-hr	7.22	5.59	0.84	0.39	0.47				
Fuel/lube truck	175bhp	0.65	1	10	3.36	2.60	0.39	0.18	0.22 gm/bhp-hr	8.43	6.52	0.98	0.45	0.55				
Total =														55.81	17.93	4.14	1.89	2.77

Notes:

(1) See notes for combustion emissions.

Waste Water Pipeline Construction Heavy Equipment Daily Emissions

Equipment	Equipment Rating	Equipment Units	Load Factor(1)	Number of Units	Hrs/Day Per Unit	NOx	CO	Emission Factors (1) VOC	SOx	PM10	Units	NOx	CO	Daily Emissions (lbs/day) VOC	SOx	PM10		
Trencher	150bhp	0.38	1	10	6.90	1.00	0.40	0.18	0.30 gm/bhp-hr	8.67	1.26	0.50	0.23	0.38				
Backhoe	100bhp	0.38	1	10	6.90	1.00	0.40	0.18	0.30 gm/bhp-hr	5.78	0.84	0.34	0.15	0.25				
Compactor	100bhp	0.59	1	10	6.90	1.00	0.40	0.18	0.30 gm/bhp-hr	8.97	1.30	0.52	0.24	0.39				
Loader	150bhp	0.38	1	10	6.90	1.00	0.40	0.18	0.30 gm/bhp-hr	8.67	1.26	0.50	0.23	0.38				
Grader	100bhp	0.54	1	10	6.90	1.00	0.40	0.18	0.30 gm/bhp-hr	8.21	1.19	0.48	0.22	0.36				
Water Truck	150bhp	0.65	1	10	3.36	2.60	0.39	0.18	0.22 gm/bhp-hr	7.22	5.59	0.84	0.39	0.47				
Dump Truck	300bhp	0.65	1	10	3.36	2.60	0.39	0.18	0.22 gm/bhp-hr	14.44	11.18	1.68	0.77	0.95				
Total =														61.98	22.61	4.85	2.22	3.17

Notes:

(1) See notes for combustion emissions.

Transmission Line Interconnect Construction Heavy Equipment Daily Emissions

Equipment	Equipment Rating	Equipment Units	Load Factor(1)	Number of Units	Hrs/Day Per Unit	NOx	CO	Emission Factors (1) VOC	SOx	PM10	Units	NOx	CO	Daily Emissions (lbs/day) VOC	SOx	PM10		
Auger	150bhp	0.75	1	10	6.90	1.00	0.40	0.18	0.30 gm/bhp-hr	17.11	2.48	0.99	0.45	0.74				
Backhoe	100bhp	0.38	1	10	6.90	1.00	0.40	0.18	0.30 gm/bhp-hr	5.78	0.84	0.34	0.15	0.25				
Crane	250bhp	0.43	1	10	6.90	1.00	0.40	0.18	0.30 gm/bhp-hr	16.35	2.37	0.95	0.43	0.71				
Crawler Tractor	300bhp	0.57	1	10	6.90	1.00	0.40	0.18	0.30 gm/bhp-hr	26.01	3.77	1.51	0.68	1.13				
Water Truck	150bhp	0.65	1	10	3.36	2.60	0.39	0.18	0.22 gm/bhp-hr	7.22	5.59	0.84	0.39	0.47				
Air Compressor	50bhp	0.48	1	10	6.90	1.00	0.40	0.18	0.30 gm/bhp-hr	3.65	0.53	0.21	0.10	0.16				
Total =														76.13	15.58	4.83	2.20	3.47

Notes:

(1) See notes for combustion emissions.

Natural Gas Pipeline Construction Delivery Truck Daily Emissions

Number of Deliveries Per Day	Average Round Trip Haul Distance (miles)	Vehicle Miles Traveled Per Day	Emission Factors (lbs/vmt)(1)						Daily Emissions (lbs/day) SOx	PM10	CO	NOx	VOC
			NOx	CO	VOC	SOx	PM10						
4	165.6	662.4	0.028018	0.017529	0.002516	0.001158	0.001575	18.56	11.61	1.67	0.77	1.04	

Notes:
(1) See notes for combustion emissions.

Waste Water Pipeline Construction Delivery Truck Daily Emissions

Number of Deliveries Per Day	Average Round Trip Haul Distance (miles)	Vehicle Miles Traveled Per Day	Emission Factors (lbs/vmt)(1)						Daily Emissions (lbs/day) SOx	PM10	CO	NOx	VOC
			NOx	CO	VOC	SOx	PM10						
6	165.6	993.6	0.028018	0.017529	0.002516	0.001158	0.001575	27.84	17.42	2.50	1.15	1.56	

Notes:
(1) See notes for combustion emissions.

Transmission Line Interconnect Construction Delivery Truck Daily Emissions

Number of Deliveries Per Day	Average Round Trip Haul Distance (miles)	Vehicle Miles Traveled Per Day	Emission Factors (lbs/vmt)(1)						Daily Emissions (lbs/day) SOx	PM10	CO	NOx	VOC
			NOx	CO	VOC	SOx	PM10						
10	165.6	1656	0.028018	0.017529	0.002516	0.001158	0.001575	46.40	29.03	4.17	1.92	2.61	

Notes:
(1) See notes for combustion emissions.

Natural Gas Pipeline Construction Daily Fugitive Dust Emissions

	Daily Process Rate Per Unit	Units	PM10 Emission Factor(1) (lbs/unit)	Control Factor(1) (%)	PM10 Emissions (lbs/day)
Operation					
Windblown Dust		2000sq.ft./day	2.52E-05	66%	0.02
Excavation		667cu.yd./day	0.0018	0%	1.20
Back filling		700tons/day	0.0001	0%	0.07
Grader Operation		10vmt	0.2754	0%	2.75
Water truck unpaved surface travel		10vmt	0.1522	66%	0.51
Delivery truck unpaved surface travel		2vmt	0.15888	66%	0.11
Total =					4.66

Notes:

- (1) See notes for fugitive dust emission calculations.

Waste Water Pipeline Construction Daily Fugitive Dust Emissions

	Daily Process Rate Per Unit	Units	PM10 Emission Factor(1) (lbs/unit)	Control Factor(1) (%)	PM10 Emissions (lbs/day)
Operation					
Windblown Dust		3000sq.ft./day	2.52E-05	66%	0.03
Excavation		1500cu.yd./day	0.0018	0%	2.70
Back filling		900tons/day	0.0001	0%	0.09
Grader Operation		8vmt	0.2754	0%	2.20
Water truck unpaved surface travel		8vmt	0.1522	66%	0.39
Delivery truck unpaved surface travel		1 vmt	0.15888	66%	0.06
Total =					5.47

Notes:

- (1) See notes for fugitive dust emission calculations.

Transmission Line Interconnect Construction Daily Fugitive Dust Emissions

	Daily Process Rate Per Unit	Units	PM10 Emission Factor(1) (lbs/unit)	Control Factor(1) (%)	PM10 Emissions (lbs/day)
Operation					
Windblown Dust		1000sq.ft./day	2.52E-05	66%	0.01
Excavation		500cu.yd./day	0.0018	0%	0.90
Back filling		250tons/day	0.0001	0%	0.03
Water truck unpaved surface travel		2vmt	0.1522	66%	0.10
Delivery truck unpaved surface travel		2vmt	0.15888	66%	0.10
Total =					1.14

Notes:

- (1) See notes for fugitive dust emission calculations.

Notes - Fugitive Dust Emission Calculations

(1) Paved road travel emission factors for delivery trucks and worker automobiles are based on AP-42, Section 13.2.1, 10/97.

(Based on default road silt loading shown in AP-42, page 13.2.1-5, 10/97, limited access roads.)

(2) Wind erosion emission factor for active construction area is based on "Improvement of Specific Emission Factors (BACM Project No. 1), Final Report", prepared for South Coast AQMD by Midwest Research Institute, March 1996.

(3) Finish grading emission factor is based on AP-42, Table 11.9-1, 7/98.

(4) Bulldozer excavation emission factor is based AP-42, Table 11.9-1, 7/98.

(Based on default soil silt and moisture contents shown in AP-42, Table 11.9-3, 7/98, overburden.)

(5) Material unloading emission factors are based on AP-42, p. 13.2.4-3, 1/95.

(Based on average annual wind speed recorded onsite and default soil moisture content shown in AP-42, Table 11.9-3, 7/98, overburden.)

(6) Loader unpaved surface travel emission factor is based on AP-42, Section 13.2.2, 1/95.

(Based on default soil silt and moisture contents shown in AP-42, Table 11.9-3, 7/98, overburden.)

(7) Trenching emission factor is based on AP-42, Table 11.9-2 (dragline operations), 1/95.

(Based on default soil moisture content shown in AP-42, Table 11.9-3, 7/98, overburden.)

(8) Unpaved surface travel emission factors for water trucks, fuel trucks, service trucks, dump trucks, forklifts, pickup trucks, delivery trucks, and concrete trucks are based on AP-42, Section 13.2.2, 9/98.

(Based on default soil silt and moisture contents shown in AP-42, Table 11.9-3, 7/98, overburden.)

(9) Dust control efficiency for unpaved road travel and active excavation area is based on "Control of Open Fugitive Dust Sources", U.S. EPA, 9/88.

(Based on default evaporation rate shown in EPA document, Figure 3-2, 9/88, and typical water application rate shown in EPA document, page 3-23, 9/88.)

Notes - Combustion Emissions

(1) For Construction Equipment

For heavy Diesel construction equipment, emission factors based on equipment meeting EPA 1996 off-road Diesel standards and use of CARB ultra low-sulfur fuel.

For trucks, depending on size of truck, emissions factors based on MVE17G version 1.0c for heavy-heavy duty or medium duty Diesel trucks, fleet average for calendar year 2000.

For portable equipment, emission factors based on EPA's "Non-road Engine and Vehicle Emission Study Report", 11/91, Table 2-07, for generator sets, welders, pumps, and air compressors less than 50 hp.

(2) For Delivery Trucks

From MVE17G version 1.0c, heavy-heavy duty Diesel trucks, fleet average for calendar year 2000.

(3) For Worker Travel

From MVE17G version 1.0c, average of light duty automobiles and light duty trucks, fleet average for calendar year 2000.